# 2.9 Moles, Molar Mass and Empirical Formula Calculations: 10-minute Pack

EDEXCEL 4CH1 · Calculator allowed · about 10 minutes

Total Marks

Name: _____ Date: ____ / ____ / _____

**Answer in full sentences for Questions 1 and 2 only. Use a calculator where allowed. Suggested time 10 minutes.**

**1** State the meaning of the term relative atomic mass, Ar, as used in quantitative chemistry and read from the periodic table.

**(Total for Question 1 is 1 mark)**

**2** Give the relative formula mass, Mr, of a compound and explain briefly how it is obtained from relative atomic masses read from the periodic table.

**(Total for Question 2 is 1 mark)**

**3** Define the mole as an amount of substance in terms of the Avogadro constant, in the context of counting atoms and molecules for calculations.

**(Total for Question 3 is 1 mark)**

**4** State the value of the Avogadro constant used in the Edexcel IGCSE context, and give its units.

**(Total for Question 4 is 1 mark)**


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**5** A student reads the periodic table and finds Ar for sodium is 23 and for oxygen is 16. Calculate the relative formula mass, Mr, of $Na_2O$ and show your working.

**(Total for Question 5 is 2 marks)**

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**6** Show that 0.150 mol of water molecules contains approximately $9.03 \times 10^{22}$ molecules. Quote the equation used and substitute the Avogadro constant $6.02 \times 10^{23}$ $mol^{-1}$.

**(Total for Question 6 is 3 marks)**


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# Mark scheme · 2.9 Moles, Molar Mass and Empirical Formula Calculations: 10-minute Pack

## Question 1

Ar is the average mass of an atom of an element compared with 1/12 of the mass of a carbon-12 atom **B1**

**Answer: Ar is the average mass of an atom compared with 1/12 the mass of carbon-12**

## Question 2

Mr is the sum of the relative atomic masses of all atoms in the formula of the compound **B1**

**Answer: Mr is the sum of the Ar values of all atoms in the compound formula**

## Question 3

one mole is the amount of substance containing $6.02 \times 10^{23}$ specified particles (atoms, molecules or formula units) **B1**

**Answer: One mole contains $6.02 \times 10^{23}$ specified particles (atoms or molecules)**

## Question 4

$6.02 \times 10^{23}$ particles per mole (or per mol) **B1**

**Answer: $6.02 \times 10^{23}$ particles per mole**

## Question 5

writes Mr = (2 x Ar of Na) + (1 x Ar of O) as the working equation **M1**

Mr = 62 cao **A1**

**Answer: Mr $Na_2O$ = (2 x 23) + 16 = 62**

## Question 6

writes equation: number of particles = moles x Avogadro constant **M1**

substitutes: number = $0.150 \times 6.02 \times 10^{23}$ **M1**

evaluates number = $9.03 \times 10^{22}$ particles cao **A1**

**Answer: Number = $0.150 \times 6.02 \times 10^{23} = 9.03 \times 10^{22}$ molecules**


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